REMARKS

New Title of Invention

Please change the title of the invention to read "**Apparatus and Method for Modulating Light to Improve Readout for an Optical Pickup.**"

Amendments to Correct Typographical Errors

Claims 1 and 23 are amended to change the word "directed" to -"diffracted"-. This was a previously-unnoticed typographical error in the originally-filed claim set, likely introduced by a spell-checker, and is unrelated to patentability.

Claims Rejections - 35 U.S.C. 102(b)

Applicant's undersigned counsel, and applicant's representative Ms. Michelle D. Simkulet, engaged in a telephone conference with Examiner Hindi on June 15, 2004.

In this conference, applicant's counsel and representative pointed out that claim 1 recites "an electronically reconfigurable diffraction grating *modulating relative light intensities of at least two different diffraction orders* of light diffracted by said electronically reconfigurable diffraction grating." Claim 23 similarly recites the step of "*modulating relative light intensities of at least two different diffraction orders* of light diffracted by an electronically reconfigurable diffraction grating." Claim 45 recites that light striking the detector "comprises *at least two individual diffractive orders*

diffracted by an electronically reconfigurable diffraction grating, whereby *each said individual diffractive order is possessing individual measuring properties comprising an intensity, an intensity modulation and a phase.*"

As clearly set forth in applicant's discussion of prior art, and in a very similar discussion of prior art in Takahashi, U.S. 5,638,353, diffraction gratings are routinely employed in optical pickups to diffract light into the zeroth and +/- first light orders.

Takahashi appears to distinguish over prior art uses of diffraction gratings in optical pickups by employing a variable rotation angle diffraction grating **3A** for *controlling "where the three beams are projected"* (column 6, lines 6-8). Additionally, Takahashi employs a variable aperture device **7** for *controlling "the diameter of a projecting spot* formed on the optical disk" (column 6, lines 11-12). Thus, Takahashi controls the location and diameter of the beams, *but not their relative intensities among different orders.* Additionally, Takahashi is still constrained by the prior art approach which seeks to avoid overlapping beam spots of different order, since there is no way to distinguish which order is received unless the light spots from each order are confined to strike distinctly non-overlapping locations on the optical disk.

Applicant, in contrast, distinguishes over prior art uses of diffraction gratings in optical pickups, including Takahashi, by using "an electronically reconfigurable diffraction grating *modulating relative light intensities of at least two different*

diffraction orders," as set forth in claims 1 and similarly in claim 23, and by "*each said individual diffractive order . . . possessing individual measuring properties comprising an intensity, an intensity modulation and a phase.*" This provides the underlying basis on which it is possible to employ *overlapping* light spots of different order without confusion (which examiner has acknowledged is novel and non-obvious by his allowance of claims 2, 4-12, 17-22, 24, 26-34 and 39-44), because the known modulation of intensity among the varying orders allows the diffraction order of a particular received signal to be also be known. This in turn leads to, for example, the ability to significantly increase optical storage density.

In short, Takahashi uses a variable rotation angle diffraction grating for controlling where the zeroth and +/- first order beams strike but continues be constrained to produce non-overlapping beams. This variable rotation angle diffraction grating does not modulate relative intensity among orders, *nor is it technically capable of modulating relative intensity among orders.*

Applicant, in contrast, uses an electronically reconfigurable diffraction grating *modulating relative light intensities* which does not affect where these beams strike or their diameters. Rather, applicant's reconfigurable diffraction grating affects the *relative intensities among varying order beams.* This enables information from these beams to be decoded without confusion *even if and when they do overlap.* Then, applicant then takes direct advantage of this, by employing

overlapping beams of varying order to reduce storage density, allow for "read-ahead," and to obtain other related benefits.

This is all set forth in great detail in applicant's disclosure, page 17, line 9, through page 18, line 11, emphasis added: "The *distribution of intensity between the diffracted orders of light is modulated* at a frequency which is high compared to the data readout frequency. This dynamic control of the grating configuration is only possible by utilizing an electronically reconfigurable grating **442**. As a result, scanning of the optical storage media **450** surface will take place in a stepwise fashion such that *when the intensity of the diffracted light energy is concentrated in the higher orders, points farther from the center are mostly illuminated,* and *when the intensity of the diffracted light energy is concentrated in the zero order, the center is predominantly illuminated.* The selection of the diffraction order that receives the majority of the light energy and therefore is mostly illuminated on the optical storage media **450** is defined by the voltage applied to the electronically reconfigurable grating **442**, with programmable sequential voltage steps implemented by the control system **444**. *The selected diffraction order is therefore known and the individual diffraction orders do not need to be resolved in the image on the photodiode array **456**. This allows the diffraction orders to partially overlap with one another without compromising the information readout, and leads to the capability for higher optical disk storage densities and faster information retrieval. Knowledge of the modulation of the intensity in individual*

diffraction orders, as implemented in the electronically reconfigurable diffraction grating **442** by the control system **444**, *is used to differentiate the signals at the photodetector array* ***456.***"

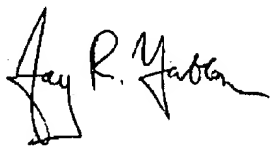
Applicant's independent claims 1, 23 and 45 are thus allowable over the prior art of record, without substantive amendment, because: claims 1 and 23 clearly recite "modulating relative light intensities of at least two different diffraction orders" while claim 45 clearly recites that "each said individual diffractive order is possessing individual measuring properties comprising an intensity, an intensity modulation and a phase"; each of these claims makes clear that applicant's "electronically reconfigurable diffraction grating" is functionally responsible for this modulation of intensity; this is not in any way disclosed, suggested or motivated by Tahahashi or any other prior art of record; the prior art actually *teaches away* from applicant by requiring non-overlapping spots while applicant employs the underlying approach of modulating "relative light intensity" among "each individual diffractive order" to allows overlap and then takes advantage of this overlap to, e.g., reduce storage density; and the foregoing is fully supported in applicant's disclosure as filed. The above discussion also makes moot, any other issues raised by examiner in the office action for these independent claims, as well as for any rejected dependent claims.

Conclusion

Consequently, applicant respectfully requests allowance of

all claims and looks forward to receiving a notice of allowance in the near future, or to a phone conference to resolve any outstanding issues that may remain following this reply.

Respectfully submitted,



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